

REMARKS

The undersigned Counsel previously submitted a Change of Correspondence Address (copy attached), which, according to an acknowledgement post card from the PTO (copy also attached), was received at the PTO on October 1, 2002. The Examiner is asked to please make sure that the correspondence address in the file is correct (namely, 16355 Vintage Oaks Lane, Delray Beach, Florida 33484), since the Office Action of April 28, 2003 was sent to an old address.

A Further Supplemental Information Disclosure Statement, PTO-1449, and further document for consideration are submitted herewith.

Claims 36-39, 42, 49, 50 have been amended to remove the objections under 35 USC 112, second paragraph.

Claims 28 - 45, 47 and 48 stand rejected as being obvious over the disclosure of Carpenter (GB 693168) taken in view of Arkhangelsky et al (WO 96/10545). Applicant respectfully traverses this rejection and requests reconsideration.

Carpenter discloses a method comprising mixing vermiculite with a coating material comprising silicate of soda (otherwise known as sodium silicate) or the like and a filler, and then subjecting the mixture to heat treatment by passing through a rotary kiln. As pointed out by the Examiner, the heat treatment exfoliates the vermiculite and melts the coating material. See page 1 lines 8 to 11 and lines 21 to 29. Claim 1 of Carpenter also describes the heat treatment step as melting the coating material. Carpenter discloses that the heat treatment may be accomplished in one or

more stages, and may involve a second vitreous coating to act as a binder to bind the initially coated material into a block or slab by pressing or rolling prior to cooling (see page 1 lines 43 to 48). Reference again is made to this two-step coating method at page 1 lines 76 to 86.

As recognized by the Examiner, there is no disclosure in Carpenter of the amount of vermiculite or silicate of soda used, or indeed the amount of any other material that may be included in Carpenter's mixture. Furthermore, there is no disclosure of the particle size of vermiculite used.

However, the Examiner apparently relies for these missing details upon the disclosure by Arkhangelsky et al. This document discloses a fire-resistant building material produced by heat-treating a mixture of 38 to 74 weight percent of vermiculite with a silicate and /or phosphate binder. The vermiculite is disclosed as having a particle size of at least 0.05 mm. As a consequence, the Examiner asserts that it would have been obvious to use the vermiculite/ceramic binder mixture disclosed by Arkhangelsky et.al in the method disclosed by Carpenter. In drawing this conclusion, the Examiner is relying on hindsight. Furthermore, a combination of the disclosures in Carpenter and Arkhangelsky et al does not result in a method as defined in Applicant's claim 1, as will be explained below.

It is noted initially that the Carpenter method was disclosed in 1951, i.e. over 50 years ago. The skilled person in the art, seeking to combine a mixture of vermiculite and a ceramic binder into a fire or heat-resistant product, would not likely consider the disclosure in Carpenter relevant to begin with. However, even if this old art was considered relevant, a combination of Carpenter and the disclosure by Arkhangelsky et

al would not result in the claimed invention. In particular, claim 1 of the present Application requires that its vermiculite have a particle size such that 60 % of the vermiculite not pass through a 1 mm sieve. In other words, 60% of the vermiculite must have a particle size of at least 1 mm. In contrast, Arkhangelsky et al merely requires that its vermiculite have a particle size of at least 0.05 mm, which is 20 times less than the 1 mm specified in claim 1 of the present Application, and does not disclose the amount of vermiculite in the claimed particle size range.

Secondly, the method of the claimed invention is distinguished from that disclosed by Carpenter as Carpenter requires melting of his sodium silicate binder (although it is more accurate to describe this as softening above the glass transition temperature of sodium silicate). Indeed, in Carpenter this is essential if coating is to be achieved. "Melting" takes place in a rotary kiln at a temperature above the glass transition temperature (Tg) of sodium silicate.

In contrast, the method of the claimed invention requires coating vermiculite particles with a ceramic binder and then drying and/or curing the binder. This is distinct from melting the binder. In more detail, and as the Examiner is undoubtedly aware, curing involves a chemical reaction, namely cross-linking. This is distinct from melting, in which a solid changes phase to a liquid, but remains the same material, i.e. undergoes no chemical change. As evidence of the understanding of the term "curing" in the art, attached is an extract from the Polymer Science Dictionary (1990), page 97, which provides the definition. Thus, in the claimed invention the mixing step is typically carried out at room temperature, although the claimed invention is not limited to this, and the coated material (or more particularly the binder) is then dried or cured,

optionally by heating to a temperature significantly lower than the Tg of silicate of soda.

This difference in approach, i.e. Carpenter melting his coating material and the present invention merely drying or curing the coating material, has a significant effect on the nature of the product obtained thereby. The foregoing is believed to be dispositive of the issue, but in order to further demonstrate the point, Applicant attaches, in accordance with Rule 132, a Statutory Declaration by Dr. Paul Jackson (faxed copy).

As is explained in Dr. Jackson's Declaration, the method disclosed by Carpenter was reproduced using a rotary kiln, and compared with a two-step process according to the claimed invention. The amounts of vermiculite and binder, and the particle size of vermiculite were chosen so as to fall within the claims of the present Application. As reported, processing difficulties were encountered utilizing the Carpenter method. In particular, after a short period of time, the tube of the rotary kiln became blocked, and the coated material had to be removed by hand. A small deposit remained in the tube which was fused quite strongly to its surface, but it was thought that it should be possible to remove this residue by immersion in dilute acid.

Furthermore, as Dr. Jackson mentions in his Declaration, it is doubted that the Carpenter method would be industrially viable, at least in relation to the materials claimed in the present Application. Still further, the product obtained by the Carpenter method comprised loose bonding at its edges, and had a very low compressive strength as compared to the product obtained by the two-step method of the claimed invention. In particular, and as reported in Dr. Jackson's Declaration, the product obtained by the Carpenter method could be broken by a person hitting the product with

the palm of their hand. In contrast, the commercial product made by the two-step method of the claimed invention typically has a compressive strength in the order of 550 to 600 kPa.

For these reasons, Applicant submits that even if a person skilled in the art were to apply the teaching in Carpenter to a vermiculite/ceramic binder mixture as disclosed by Arkhangelsky et al, the claimed invention, the claimed invention would not be achieved. Instead, a far inferior product would be obtained.

Accordingly, the subject matter of Applicant's claims 28-41 would not have been considered obvious to one skilled in the art over Carpenter in view of Arkhangelsky et al.

The dependent claims provide even further distinctions over the prior art.

Claims 42 to 45, 47 and 48 are each directed to a heat resistant product obtained by a method according to claim 28, in different forms. In view of Applicant's submission that the method defined in claim 28 would not have been considered obvious over Carpenter in view of Arkhangelsky et al, it follows that the heat resistant product obtained by that method would likewise not have been considered obvious. Furthermore, and as explained above, the heat resistant product of the claimed invention has distinct benefits, in terms of, for example, compressive strength, as compared to the product obtained in the reproduction of the Carpenter method. These benefits could not have been predicted from the prior art, and further support Applicant's argument for non-obviousness of the product claimed.

Furthermore, the subject matter of claims 46 and 52 are not obvious over Carpenter in view of Arkhangelsky et al, and further in view of Slic et al (US 6230458).

The Examiner cites the reference by Slic et al in relation to the feature required by claims 46 and 52, that the product (i.e. that of claim 42) is sandwiched between load supporting sheets adhered thereto. It was explained above that the product obtained by the process of the claimed invention, as defined in claim 42 would not have been considered obvious by the skilled person over Carpenter in view of Arkhangelsky et al, for a number of reasons. Thus, a sandwich structure including that product, as defined in claim 46, and a fire wall comprising that product defined in claim 52, would not have been considered obvious in view of these documents, in combination with Slic et al.

The Examiner also indicates that the subject matter of claim 49 would be considered obvious over Carpenter in view of Arkhangelsky et al and further in view of JP 08059370. The Examiner relies upon the Japanese document for its disclosure of spraying loose particles on to a surface. However, JP 08059370 does not relate to heat-resistant products. Instead, this document relates to a liquid glaze undercoated on a surface of a substrate and to which dried particles formed by granulating glaze are applied thereto. Therefore, the skilled person faced with the problem of providing an improved heat-resistant product would not consider the disclosure in this document to be at all relevant. Irrespective of this, even were the skilled person to consider JP 08059370 relevant, as explained above, as neither Carpenter nor Arkhangelsky et al, nor a combination thereof, achieves a coated vermiculite product of the type according to the claimed invention, claim 49 cannot be considered obvious. JP 08059370 does not provide any details that would bridge the gap between the disclosures in Carpenter and Arkhangelsky et al and the claimed invention, in order to render the claimed invention obvious.

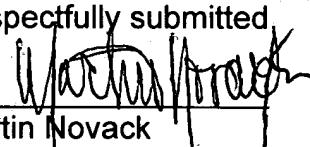
The Examiner also finds that the subject matter of claims 50 and 51 would have been considered obvious over Carpenter in view of Arkhangelsky et al, and further in view of Stroom et al (US 6245301) in relation to claim 50, and further in view of Crompton (US 5082494) in relation to claim 51. Again, these rejections are traversed. As explained above, as the combination of Carpenter and Arkhangelsky et al. does not result in, or render obvious, the product of the claimed invention, as defined in claim 42, further combinations of these documents with additional documents cannot lead the skilled person to the subject matter of any claim dependent upon claim 42. Therefore, the subject matter of each of claims 50 and 51 would not have been considered obvious.

In view of the foregoing it is believed that all claims of this application are now in condition for allowance, and such favorable action is respectfully solicited. In the event there are any remaining issues, however, it is asked that the Examiner kindly telephone the undersigned counsel collect so that they can be resolved.

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Respectfully submitted

  
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# POLYMER SCIENCE DICTIONARY

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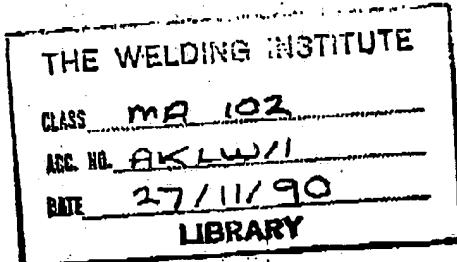
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some stretching. Very fine filaments (down to 0·4 denier) and yarn (down to 15 denier) may be made. The strength (tenacity, 2·3 g denier<sup>-1</sup>, dry) is greater than viscose rayon, with an elongation at break of 15% (dry) and 25% (wet). The fine filament fabrics have good drape and can appear similar to silk.

**CUPRESA** Tradename for a cuprammonium rayon yarn.

**CUPRO** Generic name for regenerated cellulose fibres produced by the cuprammonium process.

**CURE** (1) The process of deliberately crosslinking a polymer to improve its properties, especially the mechanical properties such as stiffness. In plastics materials curing will convert linear or branched solid thermoplastic, or liquid low molecular weight precursor polymer, to a hard, stiff thermoset material. The term is particularly used to refer to the crosslinking of unsaturated polyester and epoxy resins. In rubbers the term is often used to mean vulcanisation.

(2) The development of useful properties as a result of crosslinking a polymer. Of most interest are the mechanical properties, especially important being the modulus increase with cure. Solubility and swellability decrease with increasing crosslinking (and cure). Sometimes the term, state of cure, is used in this way. In rubbers the course of the curing (vulcanisation) reaction is followed in a curemeter as the rate of cure.

**CUREMETER** An instrument for following continuously the progress of curing during vulcanisation of a rubber by measuring the stiffness of the rubber, contained in a heated chamber, as curing takes place. Typically the dynamic shear modulus is measured by measuring the force required to move a paddle oscillated whilst it is sandwiched between two rubber test specimens. In the oscillating disc curemeter, the rotor is embedded in the sample and is oscillated through a small arc and the torque required to do this is measured. Thus a torque-time (cure-time) curve is generated from which the vulcanisation parameters, scorch time, cure time and final modulus, can be calculated. The cure curve is usually one of three types: (1) cure to a constant equilibrium torque, which is found with many synthetic rubbers, (2) cure to a maximum torque followed by reversion, often found with natural rubber and (3) cure with torque continuously increasing, found with some synthetic rubbers.

**CURE TIME** The time required during vulcanisation of a rubber for the rubber to reach a desired state of cure.

**CURIE-POINT PYROLYSIS** Pyrolysis of a thin layer of material coated onto a wire which is then heated to its Curie point by induction heating. A precise pyrolysis temperature is thus achieved, in contrast to other pyrolysis methods. The pyrolytic degradation products are usually determined by pyrolysing directly in the

## CYANOACRYLATE

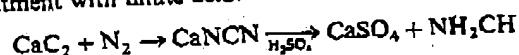
carrier gas stream of a gas-liquid chromatograph (pyrolysis gas chromatography).

**CURTAIN ELECTROPHORESIS** (Continuous zone electrophoresis) A technique of paper electrophoresis for the separation and purification of proteins on a larger scale than usual for paper electrophoresis. The sample is continuously applied to a point in the middle of the top edge of a vertically mounted sheet of filter paper. It is eluted by a continuous stream of eluent applied across the whole of the edge of the paper. Simultaneously an electric field is applied horizontally across the paper to separate the components of the mixture in this direction. The separated proteins are collected in a row of receivers along the bottom edge of the paper.

**CVNR** Abbreviation for constant viscosity natural rubber.

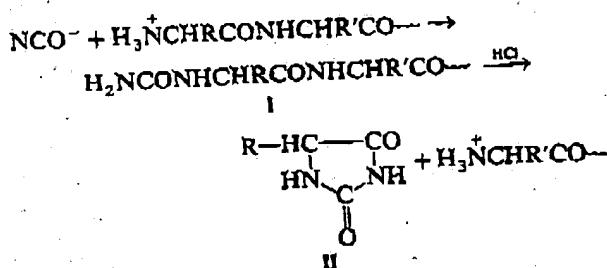
**CYANACRYL** Tradename for acrylic elastomers.

**CYANAMIDE** NH<sub>2</sub>CN. M.p. 42°C. Its calcium salt is produced by reaction of calcium carbide with nitrogen and is converted to cyanamide in aqueous solution by treatment with dilute acid:

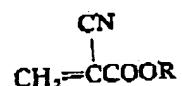


In slightly alkaline aqueous conditions cyanamide is converted to dicyanamide.

**CYANATE METHOD** A method for the determination of the N-terminal amino acid of a peptide or protein. Reaction of the amino group with cyanate ion at pH 10 in 8 M urea yields an N-carbamyl derivative (I). On heating with acid this yields a hydantoin (II), which is separated from the amino acids produced by chromatography, and is identified and determined quantitatively:



**CYANOACRYLATE** (Alkyl-2-cyanoacrylate)



where R is an alkyl group, normally an ethyl or methyl group. An acrylic monomer, which although it polymerises by a free radical mechanism, can also be polymerised anionically in the presence of a mild base—even water. This is made use of in cyanoacrylate adhesives. Methyl cyanoacrylate is produced by depolymerisation of the